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ABSTRACT

In order to (1) determine the cross-situational generalizability of self-monitoring behavior and (2) explore the correlation of self-monitoring behavior with other cognitive skills and achievements, 96 fifth-grade children were given three tasks assumed to measure the ability to self-monitor knowledge state during learning. During the first of two individual test sessions, children were given six subtests of the Wechsler Intelligence Scale for Children (Revised). In the second session, conducted about 10 days later, the three self-monitoring tasks were administered: A self-paced serial recall task assessed the child's tendency to evaluate his or her state of recall readiness during study; information was presented orally to the child and questions were asked to see whether the child could identify inconsistencies or omissions; and the Missing Elements subtest of the KeyMath test, requiring the child to identify information omitted from an orally presented arithmetic problem, was administered. Reading and math achievement scores on the Comprehensive Test of Basic Skills and IQ scores from the Short Form Test of Academic Aptitude were obtained from school records. Results are discussed, and it is concluded that despite apparent commonalities in requirements for adequate performance, the three tasks appear to reflect separate, unrelated skills. (RH)

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Children's Ability to Self-Monitor Information Acquisition

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Abstract

Ninety-six fifth grade children were given three tasks assumed to measure aspects of the ability to self-monitor knowledge state during the acquisition of information. Performance on a self-paced serial recall task was not related to the ability to analyze stories containing incomplete or inconsistent information (adapted from Markman, 1979) or to performance on the Missing Elements subtest of the KeyMath test. When performance only on the first story was examined, a relationship was found to self-reports concerning study behavior in the serial recall task. It appeared that these relationships might be due to verbal response styles, rather than to common requirements regarding self-monitoring skill. The serial recall task measures predicted reading and math achievement test scores, as well as scores on the Short Form Test of Academic Aptitude (SFTAA) and several WISC-R subtests. The Missing Elements subtest predicted performance on tasks assessing mathematical and general intellectual skills. Performance on the stories task was unrelated to any of the achievement indices. Despite apparent commonalities in requirements for adequate performance, the three tasks appear to reflect separate, unrelated skills.

Children's Ability to Self-Monitor Information Acquisition

In recent articles, Flavell(1979), Paris and Lindauer (1982), and Brown and her colleagues (Brown, Bransford, Ferrara, & Campione, in press) discuss the area of metacognition as one important for a wide range of cognitive activities and educational applications. Metacognition is defined by Brown et al. as referring to one's knowledge and control of the cognitive domain, including two areas in particular: knowledge about cognition and the regulation of cognition. The present study was concerned with the second area, especially with activities that play a part in the monitoring of one's knowledge state during learning. We were interested in determining the extent to which children who showed such self-monitoring in one situation would also exhibit it in others, as well as in the manner in which the several measures were correlated with other cognitive skills and achievements.

Three kinds of task were used to assess self-monitoring of cognitive activities in the acquisition of information: First, following the procedures of several previous investigations (Brown, Campione, & Barclay, 1979; Flavell, Friedrichs, & Hoyt, 1970; Moely, Leal, Taylor, & Gaines, 1981), a self-paced serial recall task was used as a way of assessing the child's tendency to evaluate his or her own state of recall readiness during study. Research has shown that older children are more likely than younger to engage in self-testing strategies such as cumulative rehearsal or anticipation of items in the course of study, and are likely to terminate recall after a longer study time, and at a time when they are indeed able to recall the items correctly. Moely, et al. (1981) found that learning disabled children, relative to normal readers, were less likely to test their own state of knowledge prior to terminating study and as a result, were less likely to recall items correctly.

A second procedure for assessing the child's self-monitoring during the

acquisition of information was one developed by Markman (1977, 1979), which involves orally presenting information to the child and using subsequent questions to determine if the child is able to identify certain inconsistencies or omissions in that information. Markman has found developmental improvement in such tasks, while other investigators (e.g., Kotsonis & Patterson, 1980) have shown that learning disabled children do less well on such a task than do children of average or above average learning ability.

The third procedure for assessing self-monitoring of knowledge state was the Missing Elements subtest of the KeyMath test. This task requires the child to identify the information that has been omitted from an orally presented arithmetic problem, information that would be necessary if the child were to attempt to solve the problem. This task appeared to us to require some of the same self-monitoring of knowledge state that seems to be involved in performing Markman's comprehension monitoring tasks. We were interested in determining whether our assumptions of common requirements of these three tasks would be supported in an examination of the interrelationships of the measures and their relationships to other measures.

Subjects were 96 fifth grade children, 42 boys and 54 girls, predominantly white (91%), from schools in a suburban Southern community. Children averaged 130.4 months of age (SD = 5.9). During the first of two individual test sessions, children were given six subtests of the WISC-R: The Information subtest was given primarily as a warm-up task; Vocabulary and Block Design were used to obtain an estimate of the child's IQ (Sattler, 1982); and Arithmetic, Coding, and Digit Span were given as part of a separate study (Stewart & Moely, 1982) concerned with the WISC-R third factor subtests. In the second session, which was conducted about ten days later, children were given three stories adapted from Markman's 1979 study; the Missing Elements subtest of the KeyMath

test; and a self-paced serial recall task, from which several measures were obtained to assess the child's tendency to monitor his or her own state of recall readiness during study. Reading and math achievement scores on the Comprehensive Test of Basic Skills (CTBS) (1974) and IQ scores from the SFTAA (1970) were obtained from school records. Means and standard deviations for each measure are shown in Table 1.

Measures obtained from the serial recall task, including correctness of recall, time taken to study, and the observed or reported use of self-testing strategies during study, were shown to be positively interrelated, but not significantly related to either a total score on the stories task or to the Missing Elements subtest. The latter measures were also unrelated to each other (r = .032). When performance on only the first trial of the stories task was examined (as the best measure of the child's spontaneous, uninformed approach to the task), relationships were found between that score and self-report measures concerning strategy use in the serial recall task. A tendency to identify the first story's inconsistency early in the questioning sequence was related to the likelihood of reporting use of relatively mature strategies in preparation for recall, which may be due to the child's readiness to engage in verbal explanations in both situations. Analyses also showed that late identification of the inconsistency in the first story co-occurred with the tendency to report self-testing as a way of deciding when to terminate study. This relationship may be explained on the basis of a consistent response tendency to be relatively impulsive or cautious in responding to an ambiguous situation. In any case, that these relationships, shown in Table 2, indicate consistent use of self-monitoring across the two tasks is unlikely, especially since performance on the story task was not related to the use of anticipation/rehearsal or to the other serial recall measures. Some of the serial recall measures were significant

predictors of reading achievement and math achievement scores on the CTBS and of intelligence as assessed by the SFTAA. These measures also predicted performance on the Arithmetic and Coding subtests of the WISC-R. As shown in Table 2, the use of anticipation or rehearsal during study was particularly important in the prediction of both the achievement tests and the two WISC-R subtests. Self-report measures also contributed to the prediction of both the achievement and intelligence measures. Trends for significant prediction of the Vocabulary subtest of the WISC-R and the WISC-R estimated IQ score by the several serial recall measures were shown through the use of multiple regression; partial correlations between particular measures, shown in Table 2, indicate that the reported use of strategies during study was related to both Vocabulary and the estimated IQ. Serial recall task measures were unrelated to performance on the Block Design or Digit Span subtests of the WISC-R.

The Missing Elements subtest of the KeyMath test predicted math achievement and the Arithmetic and Block Design subtests of the WISC-R, as well as each of the IQ measures. The task appears to tap mathematical skills quite heavily, as well as being related to measures of general intellectual ability.

The stories task, although showing reasonable internal consistency from trial to trial, did not significantly predict any of the achievement or intelligence measures. Relationships of each of the self-monitoring measures to the achievement and intelligence test scores are shown in Tables 2 and 3.

It is concluded, then, that the three measures of self-monitoring of knowledge state during study appear to be tapping different, unrelated skills, despite superficial similarities in the kinds of processes that seem to be required to perform well in each task. This conclusion is supported by examination of the patterns of relationship that the three tasks show to each other and to several achievement and intellectual measures.

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Table 1

Means and Standard Deviations for All Measures

	Mean	SD
Metacognitive Measures		
Serial Recall Task		
Anticipation/Rehearsal[a]	1.198	.832
Time Spent Studying[a]	119.240	55.458
Correctness of Recall[a]	1.375	1.098
Reported Self-Testing	1.219	.954
Reported Strategy Use	2.354	.894
Comprehension Monitoring (Stories)		
Sum for Three Stories	10.615	10.225
First Story Only	5.052	4.473
Missing Elements Subtest of KeyMath	5.406	1.804
Achievement Measures		
CTBS Reading Achievement	6.320	1.693
CTBS Math Achievement	5.563	1.347
Intelligence Test Measures		
SFTAA IQ	101.510	8.918
Estimated WISC-R IQ	99.708	11.361
WISC-R Subtests (Scaled Scores)		
Vocabulary	10.031	2.250
Block Design	9.865	2.606
Arithmetic	9.167	2.213
Coding	10.156	2.390
Digit Span	10.000	2.546

[a]Score is based on total for three trials.

Table 2

Partial Correlations of Serial Recall Task Measures

with Other Sets of Variables

Criterion Variables	Serial Recall Task Measures: Anticipation/ Rehearsal	Time Spent Studying	Correctness of Recall	Reported Self-Testing	Reported Strategy Use
Story Task					
Sum for Three Stories	-.197	.111	.174	.120	-.153
First Story Only	-.176	.187	.092	.208*	-.232*
Missing Elements Subtest	.098	-.052	.049	-.005	.159
Reading Achievement	.215*	-.144	-.221*	.045	.147
Math Achievement	.256*	-.213*	-.050	-.140	.214*
SFTAA IQ	.199	-.097	-.128	-.082	.272**
Estimated WISC-R IQ	.096	.047	-.140	-.111	.231*
WISC-R Subtests					
Vocabulary	.096	-.089	-.182	.007	.231*
Block Design	.058	.142	-.048	-.164	.138
Arithmetic	.208*	-.032	-.101	.229*	-.133
Coding	.228*	-.175	.018	-.195	.233*
Digit Span	.028	.060	-.098	.188	-.017

* $p < .05$

** $p < .01$

Table 3

Correlations of Stories Task Scores and Missing Elements Subtest with Measures of Achievement and Intelligence

	Stories Task		
	Sum (3 trials)	First Story Only	Missing Elements Subtest
Measures			
CTBS Reading Achievement	-.085	-.042	.153
CTBS Math Achievement	-.029	-.070	.266**
SFTAA IQ	-.042	-.071	.200*
Estimated WISC-R IQ	-.109	-.037	.315**
WISC-R Subtests			
Vocabulary	-.156	-.159	.173*
Block Design	-.028	.080	.314**
Arithmetic	.062	.033	.294**
Coding	-.064	-.113	.144
Digit Span	-.085	-.093	.028

*$p < .05$

**$p < .01$